

U.S. A. ARDEC
TOOLS AND EQUIPMENT ENGINEERING
DESCRIPTION FOR PURCHASE
FOR THE
TEST STAND: ALTERNATOR, GENERATOR,
REGULATOR AND STARTER (AGRS)

1 SCOPE

1.1 Scope. This description for purchase identifies and establishes the minimum requirements for an automotive Alternator, Generator, Regulator and Starter (AGRS) Test Stand. The test stand is intended to be used at repair facilities for fault diagnosis, adjustment and qualification of AGRS equipment.

2 Applicable documents.

2.1 Government documents.

2.1.1 Specifications and standards. The following standards listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation form a part of this description for purchase to the extent specified herein.

STANDARDS

(Copies of standards required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.1.2 Other Government documents, drawings and publications. The following other Government documents, drawings and publications form a part of this description for purchase to the extent specified herein.

US DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA)

29 CFR PART 1910	- Occupational Safety and Health Standards
1910.211-222 Subpart O	- Machinery and Machine Guarding

(Application for copies should be addressed to the Department of Labor, OSHA/Technical Data Center, 200 Constitution Ave NW, Washington, DC 20210).

2.2 Other publications. The following documents form a part of this purchase description to the extent specified herein. The issues of the documents, which are indicated, as DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation.

AMERICAN SOCIETY FOR TESTING MATERIALS (ASTM)

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| ASTM D3951 | - Standard Practice for Commercial Packaging |
| ASTM B633 | - Zinc on Iron & Steel Electro deposited Coating |
| ASTM G82 | - Standard Guide For Development and Use of Galvanic Series for Predicting Galvanic Corrosion Performance |

(Applications for copies should be addressed to American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959)

INSTRUMENT SOCIETY OF AMERICA (ISA)

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| ISA 82.03 | - Safety Standard for Electrical and Electronic Test, Measuring, Controlling and Related Equipment-General Requirements Harmonized Standard to IEC Publication 1010-1 |
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(Applications for copies should be addressed to the American National Standards Institute, 11 W 42nd Street, New York, N.Y. 10036 or the Instrument Society of America, P.O. Box 12277, Research Triangle Park, NC. 27709)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

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| NFPA 70 | - National Electrical Code |
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(Applications for copies should be addressed to National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269).

2.3 Order of precedence. In the event of a conflict between the text of this description for purchase and the references cited herein, the text of this description for purchase shall take precedence.

3 REQUIREMENTS

3.1 System description. The AGRS test stand shall be designed for functional testing of 12 and 24 volt (nominal) generators, alternators, and their associated regulating and rectifying equipment under varied operating conditions. The test stand shall also be capable of testing 400 ampere dual voltage, 24 volt/12 volt (nominal) negative ground alternators to 12,000 rpm. The test stand shall also incorporate provisions for free-running testing of 12 and 24 volt starters. Test circuits shall include all necessary components and accessories required for a complete test setup. Controls, binding posts, electrical cables, and applicable connectors shall be oriented for optimum safety and ease of operation whether actuated by bare or gloved hands. The test stand shall be complete and when installed shall perform the operations specified herein.

3.2 First article. When specified, the contractor shall furnish one or more complete test stands for first article inspection. The first article may be either a preproduction model or an initial production item, which conforms to the requirements of this DFP. In either case, the approved first article and the production items shall be identical and in accordance with the terms of the contract. Approval of the first article shall not relieve the contractor of the responsibility to

furnish equipment in accordance with the requirements of this DFP. Any changes or deviations by the contractor of the production test stand from the approved first article during production shall be subject to the approval of the contracting officer.

3.2.1 Test equipment. The contractor is responsible for obtaining the AGRS equipment necessary for the first article inspection specified in Section 4 of this DFP, if required. The equipment shall include (1) the dual voltage, PN N1602-1 alternator and associated regulator (2) one of the 400 ampere rated single voltage alternators and associated regulator and starter (3) one direct drive generator and (4) one of the smaller ampere rated (50 to 100 ampere) alternators or generators and associated regulator and starter. No government furnished equipment shall be provided. Information concerning the dual voltage alternators may be obtained from the manufacturer or the government-contracting officer on request.

3.3 Design characteristics. The AGRS test stand shall be completely self-contained except power source and, if required, the adapters/accessories and the container for the adapters/accessories (see par 3.3.1). The test stand shall include a mounting table which is adjustable both horizontally and vertically for the purpose of belt tensioning, Unit Under Test (UUT) positioning and connection for test. The test stand shall be provided with the essential electrical cables, controls and instrumentation for qualification testing of the alternators, generators, regulators and starters listed in Table 1.

3.3.1 Adapters/Accessories. The test stand shall be supplied with adapters/accessories, electrical cables and hardware that are necessary to mount, drive and provide electrical control and power connections to the alternators, generators, regulators and starters specified in Table I (Items listed in Table I are for information only and not to be furnished with the test stand). As a minimum these adapters/accessories shall consist of:

- a. Mounting and clamping fixtures that holds and allow for rapid clamping and positioning of the UUT to the adjustable mounting table.
- b. Fixtures for mounting belt driven and direct driven (those that drive directly from a test stand spindle to the UUT drive shaft) alternators and generators as well as fixtures for mounting and clamping a variety of regulators and starters.
- c. A complete set of belts required to test the belt driven alternators and generators listed in Table 1.
- d. Direct drive adapters for testing direct drive alternators and generators.
- e. Test electrical cables for connecting power and control from the test stand to the UUTs specified in Table 1 including cables for alternators and generators to their respective regulators as necessary.
- f. Hardware, bolts, pulleys (if required), spline adapters and miscellaneous items necessary for complete set-up and testing of the UUT.

g. A metal storage container mounted on casters shall be furnished with each test stand for storage of adapters and accessories. Space permitting, the storage container may be built into the test stand cabinet.

TABLE I
AGRS EQUIPMENT REQUIRING TESTING

<u>ALTERNATORS</u>		
<u>NSN</u>	<u>MANUFACTURER</u>	<u>PN/MODEL</u>
TBD	Bosch	3911248
6115-01-473-7860	Deere	TY24322
6115-01-473-7862	Deere	TY6798
6115-01-473-7837	Deere	AT207608
2920-01-054-4013	Delco	1100077
2920-00-231-7270	Delco	1117248
2920-01-149-8606	Delco	1105500
2920-01-215-2199	Delco	1105475
6115-01-440-7397	Delco	19010111
2920-01-054-4013	Delco	1100077
2920-01-232-5133	Delco	3016627
2920-01-232-5133	Delco	111764
2920-01-131-4932	Leece-Neville	A0014629JA
2920-01-238-9710	Leece-Neville	A0012266AA
2920-01-147-1575	Leece-Neville	A0012260AB
2920-01-030-2001	Leece-Neville	11668038
2920-01-103-8052	Motorola	70D44120C01
6115-01-419-4033*	Niehoff & Co.	N1506-1
2920-01-204-4470	Niehoff	N1375-1
2920-01-377-8446	Niehoff	N1375-2
2920-00-000-0183	Niehoff	N1501-1
2920-01-264-6542	Niehoff	N1211-2
6115-01-425-5604	Niehoff	N1601-1
2920-01-407-0532*	Niehoff	N1505-1
2920-01-420-9968*	Niehoff	N1225-1
2920-01-420-9969	Niehoff	12447109
2920-01-466-1855*	Niehoff	N1602-1
2920-01-298-8072	Niehoff	N1205
2920-01-292-2993	Niehoff	N1206
2920-01-362-5285	Niehoff	N1216-1
2920-01-134-8842	Niehoff	N1326-1
6115-01-147-5848	Niehoff	N1304-1
6115-01-419-4033	Niehoff	N1506-1
TBD	Niehoff	S340
2920-01-419-8884*	Niehoff	N1502-2
TBD	Niehoff	N1503
2920-01-458-9238	Niehoff	N1228-1
TBD*	Niehoff	S381

TBD	Niehoff	N1379-1
6115-01-504-0680*	Niehoff	N1509-1,2,3
2920-01-494-5639	Niehoff	N1307
2920-01-131-4931	Prestolite	A0014630JA
2920-01-349-9934	Prestolite	A001-4806AA
2920-01-337-9236	Prestolite	A001 -4806JB
2920-01-336-7098	Prestolite	A001 4826BJ
2920-01-329-1671	Prestolite	A001 4826AA
2920-01-347-6068	Prestolite	A0012511A
2920-01-190-2709	Prestolite	A0012264AA
2920-66-145-7036	Prestolite	8LHA3086V
6115-01-305-3400	Prestolite	8AR3080F
2920-00-909-2483	Prestolite	A0013002AC
2920-01-279-3948	Prestolite	8LHA-3071P
2920-01-182-0821	Prestolite	A001090657
6115-01-224-3128	Robert Bosch	120469579

GENERATORS

<u>NSN</u>	<u>MANUFACTURER</u>	<u>PN/MODEL</u>
2920-00-903-9534	Army Tank Auto Com	10950808
2920-01-346-6293	Bosch	0120488206
6115-01-184-7432	Bosch	0 122 469 002
2920-01-413-8273	Caterpillar	3E7577
6115-01-471-4685	Caterpillar	9W-3043
2920-01-484-9161	Cummins	3400698
6115-01-309-6762	Cummins	3911462
6115-01-325-6228	Cummins	C0191190900
6115-00-444-7719	Delco	FM3V2-B/2
2920-01-144-8796	Delco	1117647
2920-01-047-2363	Delco	1105422
6115-01-102-3063	GM MIL Vehicle	1105510
2920-00-909-2483	Leece-Neville	10013002AC
2920-00-782-1955	Leece-Neville	2184A
2920-00-475-1446	Leece-Neville	LN5504AA
2920-01-288-0497	Leece Neville	A001-5520AC
2920-00-830-6660	Lucas Aerospace Power Equipment	G22-6F
2920-00-795-6627	Lucas Aerospace Power Equipment	G22-2
2920-00-169-5715	Minowitz	11642898
2920-01-298-8072	Niehoff	N1205
2920-01-347-6069	Niehoff	A1-103
2920-00-909-2483	Prestolite	AMA5104
2920-01-298-5738	Prestolite	AMZ-400
2920-01-238-9710	Prestolite	A0012266AA
2920-01-292-2994	Prestolite	AMZ-4001
2920-01-072-9661	Prestolite	A0010905555
2920-01-168-7899	Prestolite	AMA5104UT
2920-01-208-0804	Prestolite	69-780-4

2920-01-467-5648	Samsung	60310210
2920-00-413-4337	TACOM(19207)	10947517-1

REGULATORS

<u>NSN</u>	<u>MANUFACTURER</u>	<u>PN/MODEL</u>
2920-01-021-5383	Delco	1876388
2920-01-196-4882	Delco	1116405
6110-01-167-1822	General Motors	14072341
2920-01-196-4882	J.I. Case	A46890
2920-01-145-0993	Leece-Neville	R0270 95300
6110-01-134-9981	Niehoff	A2-101
2920-01-226-4601	Niehoff	N3012
2920-01-348-1526	Niehoff	N3106
2920-01-429-9591 *	Niehoff	N3119
2920-01-415-9497*	Niehoff	N3117
6110-01-485-9081*	Niehoff	N3118
2920-01-300-3737	Niehoff	N3019
2920-00-900-7993	Niehoff	N3108
6110-01-458-1006*	Niehoff	N3123
6110-01-420-1229*	Niehoff	N3030
6110-01-468-8126	Niehoff	N3120
2920-01-169-0596	Niehoff	N3007
2920-01-166-6417	Niehoff	N3009
6110-01-494-4366	Niehoff	N3201
2920-01-279-3049	Prestolite	105-248
6110-01-204-0000	Prestolite	99400
2920-01-079-9130	Prestolite	R0270
6110-01-373-2857	Sure Power Prod	122900H

STARTERS

<u>NSN</u>	<u>MANUFACTURER</u>	<u>PN/MODEL</u>
2920-01-332-1352	Acme	563.106
2990-01-095-8547	Briggs & Stratton	390391
2990-01-192-7812	Chrysler	K1038-1
2925-01-473-9544	Deere	RE65175
TDB	Deere	RE501150
TDB	Deere	TY24443
2920-00-882-3401	Delco	1113516
2920-01-105-2053	Delco	1113250
2920-01-192-4469	Delco	1113277
2920-01-139-3722	Delco	1990272
2920-01-054-4005	Delco	1109775
2920-00-785-0833	Delco	1113847
2920-00-278-1044	Delco	1998432
2920-01-388-8860	Delco	1113291
2920-01-483-5127	Delco	1113540

2920-01-123-8306	Delco	11146951
2920-01-215-2199	Delco	1105475
2920-00-890-5025	Delco	1107538
2920-00-231-7270	Delco	1117248
2920-01-054-4013	Delco	1100077
2920-01-102-3520	Delco	1114848
2920-01-244-6058	Delco	3021036
TBD	Delco	3921403
2920-01-215-4319	Delco	1990453
2920-01-230-8891	Delco	1998367
2920-00-911-5637	Delco	1113904
2920-00-974-7626	Delco	1113930
2920-00-226-6545	Delco	10911018-1
2920-01-211-6691	Deutz	1173241
2920-01-353-7036	General Motors	10479611
2925-01-486-0116	Kalmar RT	135161
2920-01-188-7438	Leece-Neville	M001 7264MD
2920-00-267-9987	Leece-Neville	10935376
2920-01-368-9845	Lombardini	278-5840-067
2920-01-463-5526	Lombardini	0.001.363.113
2920-01-317-8249	Nippon-Denso	3904466
2920-01-407-4857	Nippondenso	228000-1750
2920-01-453-8552	Nippondenso	228002-1830
2920-01-321-8325	Onan	191-1959
2920-01-368-9140	Onan	191-1399
2920-01-040-5546	Prestolite	MHP6102T
2920-01-415-9497	Prestolite	M0017505ME
2920-01-075-2813	Prestolite	MES6401 AUT
2920-01-168-7891	Prestolite	MFY-670 1 UT
2920-01-337-5152	Prestolite	M001094187
2920-01-339-4308	Prestolite	7406MC
2920-01-507-7423	Prestolite	MFY-6711UT
2920-01-069-6997	Prestolite	M0017260MD
2920-01-364-1598	Prestolite	M0017703MD
2920-00-999-6216	Prestolite	10951385-1
2920-01-412-0140	Prestolite	12448742
2920-01-075-7763	Prestolite	MES6402IUT
2920-01-075-8114	Prestolite	M001093064
2920-00-923-8911	TACOM(19207)	10951385
2920-01-031-9027	(Generic NSN)	MS53011-2

NOTE: NSNs with asterisk (*) indicate dual voltage alternator or associated equipment.
Table For Informational Purposes Only, Equipment Not To Be Furnished With Test Stand.

3.3.2 Maintainability. The test stand shall be configured to reduce maintenance operations to the simplest procedures compatible with a minimum of maintenance skills and common equipment.

3.3.2.1 Service accessibility. The test stand shall be constructed so that disassembly and reassembly for maintenance can be performed using normally commercially available standard tools and equipment. Serviceable components shall be readily accessible for ease of maintenance. Hard to reach points requiring grease or oil shall be "tubed" to a convenient lubrication point outside the cabinet.

3.3.3 Safety requirements. The test stand shall comply with the general safety and health requirements promulgated under OSHA 29 CFR 1910 that are applicable to the test stand itself. The test stand shall provide protection from electrical shock and moving parts such as gears, belts, pulleys and other parts, which may present a hazard in accordance with OSHA 1910.211-222.

3.3.3.1 Health and environment requirements. The maximum steady state noise limit requirement for the test stand shall be 90dBA at the position where the operator is normally located. Noise level measurements shall be taken at positions around the test stand to determine the test area noise contours. Hearing protection is required when the sound level exceeds 85dBA continuous or 140 dB impulse and shall be posted on a noise level hazard sign attached to the test stand and in the operator's manual. The distance where the steady state noise level is 85dBA or less shall be indicated on the sign and in the operator's manual.

3.3.4 Electrical protection. The test stand circuits and electric components shall incorporate protection from damage in the event of internal failure resulting from high currents and from attempted operation on improper voltages. The main power inlet to the test stand shall be provided with over current protection. Fuse holders and reset controls shall be readily accessible. All reset controls shall allow quick and easy resetting without the use of tools. If one-time fuses are used, a spare set of fuses of applicable type and value shall be provided with each test stand as initial spares. Provision shall be made for storing the fuses in a readily accessible location within or on the test stand.

3.3.5 Interchangeability. All parts shall be manufactured to definite standards, clearances, and tolerance in order that any such parts of a particular type or model may be replaced, interchanged, and adjusted without modification of the replacement parts or any other parts of the unit. When practical, all parts shall be permanently and legibly marked.

3.3.6 Threads. Threads shall conform to applicable accepted industry standards.

3.3.7 Lubrication. All bearings (except sealed-for-life type), mating gears, and sliding parts shall be provided with a means for lubrication. All oil holes, grease fittings, and filler caps shall be easily accessible for servicing. An illustrated lubrication paragraph or a reference to the lubrication data plate must be included in the maintenance manual.

3.3.8 Human factors. The test stand shall be designed to facilitate ease of operation and set-up of the unit under test (e.g., controls easy to reach and manipulate; gages, dials, lamps and meters readily visible and easy to read from the operators station; UUT mounting table easily reached and convenient to manipulate; and guards and exterior panels easily removable for ease of maintenance/inspection).

3.3.8.1 Test panels. All instruments, controls, and terminals shall be mounted on instrument and control panels, and permanent and legible identification shall be marked on the panels or instruction plate to indicate their function. If etched metal nameplates are used, the background shall be painted to permit easy reading. All lettering on the test panels shall be not less than 1/8 inch in height. Terminals, binding posts, connectors, instruments, etc., necessary for testing regulators, starters, alternators, and generators shall be functionally grouped. Each group shall be permanently outlined and marked to indicate its function.

3.4 Workmanship. Workmanship shall be such as to assure equipment is of a neat general appearance, uniform in quality, and free of defects that would adversely affect life or serviceability. In no event shall any process be used for reclaiming any parts of the test stand without the approval of the procuring activity. All surfaces of all parts shall be cleaned and free from extraneous materials. External surfaces shall be smooth and all edges shall be rounded or beveled. All screws, pins, bolts, and similar parts shall be installed with means for preventing loss of tightness or adjustment. All parts subject to removal or adjustment shall not be swaged, panned, staked, or permanently deformed. Screw threads mating in aluminum or stainless steel shall be given an application of anti-seize compound.

3.4.1 Materials. Materials not specifically designated herein or in the contract shall be of a quality commensurate with commercial practice within the test stand industry, shall be suitable for the intended purpose in the design of the end item, and shall meet all requirements specified herein. Materials shall be free from defects, which would adversely affect the performance or maintainability of the individual components or the overall assembly. It shall not be permissible to use reclaimed parts as is, or rebuilt from scrap or other used equipment. Dissimilar metals used in contact with each other, which are susceptible to galvanic corrosion, shall be suitably protected to deter corrosion. Metals susceptibility to galvanic corrosion are identified in ASTM G82.

3.4.2 Electrical connections. Connections of conductors and terminal parts shall be of the screw, pressure, or solder type. When soldered connections are used, the conductors and terminal parts shall be mechanically secured before soldering. Solder joints shall be cleaned before soldering. Rosin base fluxes only shall be used in soldering operations. Connections to screw-type terminals shall be mechanically secured with means to prevent loss of tightness.

3.4.2.1 Binding posts/connector panel boards. Connector panel boards shall be of a size and composition to support connecting cables and to carry continuously the maximum current of the circuits involved. Means shall be provided to preclude connecting cables from becoming loose. Where test lead cables connect to the panel board, the connections shall be by plug to receptacle to allow for easy attachment and removal of the cable. Plug to receptacle combinations shall be sized to prevent improper hook-up and eliminate potential hazardous conditions.

3.4.3 Warranty. Warranty requirements shall be as specified in the contract.

3.5 Performance.

3.5.1 Dielectric strength. The insulation and spacing between the following conductors of the input power transformer of the test stand shall comply with the dielectric strength

requirements of ISA-82.03 Standard:

- (1) Primary winding to core, shield and secondary windings.
- (2) Secondary windings to core, shield and other secondary windings.

Each of the circuits shall withstand 1,000 volts root mean square (rms) plus twice the rated rms voltage at 60 hertz without damage. The voltage shall be raised gradually (500 volts per second nominal) to its value and maintained for one minute. Ambient air temperature shall be between 65-90 degrees F and relative humidity 40-75 percent. Evidence of dielectric breakdown or flashover shall be reason for failure.

3.5.2 Accuracy. The allowable indicated error for each test circuit of the test stand shall be no more than +/- 1 percent of full-scale value of the indicator throughout the temperature range of +32 degrees F to +115 degrees F.

3.6 Repair Parts Kit. The Repair Parts Kit (RPK) shall consist of items routinely used/replaced including hoses, belts, clips, fuses, lamps and electrical cables. The RPK shall also include one complete set of direct drive adapters for direct drive alternators and generators. These adapters are in addition to those required under paragraph 3.3.1 of this Description for Purchase. Repair parts shall be provided in quantities sufficient for two years of normal operation of the test stand. The contractor shall provide a repair parts list over-packed with each kit.

3.7 Functional characteristics. The test stand shall have the following capabilities:

- a. Automatic or manual control modes.
- b. Induce and hold load capacities up to 14.25 kilowatts on generators and alternators at 28.5 VDC within normal operating speed range of the UUT and be capable of rotating generators at no load to a maximum of 12,000 rpm, including the direct drive UUTs.
- c. Provisions to apply infinitely variable load from 0.0 to 14.25 KW.
- d. Measure and hold appropriate voltage values on the generators, alternators and starters identified in Table I.
- e. Provide an infinitely variable speed range at the test generator or alternator drive shaft of 800 to 12,000 rpm.
- f. Measure and indicate up to 12,000 revolutions per minute on all UUTs.
- g. Provide and measure load capacities up to 500 amperes for single voltage alternators and generators at 28.5 VDC and up to 200 amperes for single voltage alternators and generators at 14.7 VDC.
- h. Provide and measure the following load capacities on dual voltage alternators.

(1) 400 amperes at 28 VDC on the 24 volt output (12 volt output off).

(2) 200 amperes at 14 VDC on the 12 volt output (24 volt output off).

(3) 400 amperes total combined current on the 24 VDC and 12 VDC outputs simultaneously.

i. Provide fixed speed-load regulation generators and alternators under test. Speed and load (current) variation at the generator or alternator shall not exceed 3 percent each, at any fixed speed-load setting.

j. Measure and indicate up to 12,000 revolutions per minute on starters. Provide separate circuit for testing starter solenoids.

k. Accuracy for all instrumentation shall be within 1.5 percent of all meter values.

3.8 Physical characteristics.

3.8.1 Instrumentation. Instrumentation shall be digital characters ½ inch or larger in size when used for testing. Where a test parameter may rapidly fluctuate, an analog indicator shall be provided in addition to the digital meter. All meters shall be industrial grade. Test stand instrumentation shall effectively measure the range of performance parameters specified in paragraph 3.7. As a minimum, instrumentation shall be provided for monitoring the following parameters:

a. Starter voltage.

b. Starter amperage.

c. Starter revolutions per minute (rpm).

d. Simultaneous readings of voltage on dual-voltage alternators.

e. Simultaneous readings of amperage on dual-voltage alternators.

f. Generator/alternator alternating current supply voltage.

g. Generator/alternator alternating current supply amperage.

h. Alternator rectifier/current transformer output voltage.

i. Generator exciter field voltage.

j. Generator exciter field amperage.

k. Alternator/generator output voltage.

- l. Alternator/generator output amperage.
- m. Test stand DC power supply voltage.
- n. Test stand DC power supply amperage.
- o. UUT direct drive rpm.
- p. UUT belt drive rpm.
- q. Elapsed time display with reset.
- r. Non-resettable running time meter.

Analog meters shall be included to register rapid fluctuations of alternator/generator voltage and starter amperage.

3.8.1.1 Instrumentation calibration. Where practical, test stand instrumentation shall be equipped with calibration test taps/jacks so that instruments do not have to be removed from the cabinet when calibration is required.

3.8.2 Controls. All operating controls, and all manual adjustments, shall be grouped in a location convenient to the operator except as otherwise specified herein. The front and back of the test stand cabinet shall be designed so that components such as controls, knobs and meters do not protrude beyond the outer surface of the test stand where they are subject to damage during moving or hauling of the equipment.

3.8.3 Annunciator. An annunciator shall be furnished to aid the operator in verification of important settings, operating parameters and the protective circuit activated in the event of shutdown. The annunciator shall include alarm with manual reset and lamp test push buttons. Examples of functions that should be monitored are drive motor status, load bank status and test stand shutdown as applicable.

3.8.4 Function marking. All indicators, controls, and connectors shall be legibly marked for identification and function.

3.8.5 Starter power supply. The test stand shall be capable of simulating 12 VDC and 24 VDC vehicular power systems and must be capable of supplying up to 200 amps with a circuit breaker to protect the circuit and power supply in the event a defective starter overloads the system. The output voltage shall be adjustable over the starter testing range. An energy dissipation device shall be incorporated on both the 12 VDC and 24 VDC load bus to simulate the energy absorption characteristics of batteries in a vehicular system. An operator adjustable timer from 1 to 30 seconds shall be included to de-energize the power supply output to prevent starter motor overheating during free-running tests. Automatic timing shall be included to prevent re-energizing of the power supply for two minutes if on time exceeds 20 seconds. All internal circuitry shall be sized in accordance with the recommendations and requirements of NFPA 70. Batteries shall not be utilized in the testing circuits for this function.

3.8.6 Electrical equipment. The test stand shall perform when connected to a 3 phase, 60

hertz, 208/230/460 volt plus or minus 10 per cent power source and a 3 phase, 50 hertz, 220/380/440 volt plus or minus 10 percent power source. All electrical supplies must conform to the recommendations and requirements of NFPA 70. The electrical equipment shall include, as necessary integral circuit breakers with external manual cut off handles of the appropriate capacity and forty feet of cable with lugs for connecting the test stand to the facility power. Thermal/magnetic short circuit protection shall be provided as necessary to protect the equipment for the input voltages and frequencies specified. The power cable shall be capable of laying on the floor. Overhead entry to the test stand is not acceptable. The contractor shall also provide a starter for the electric motor if required. The input power may be reduced to provide 115 or less volts alternating or direct current, as required, for operating internal circuitry.

3.8.7 Main drive. The main drive electric motor shall have sufficient power to drive and perform all tests on the generators and alternators listed in Table 1 and maintain a constant revolutions per minute (RPM) when the prescribed load is applied to the UUT. The electric motor shall have protection against overload and low voltage damage. Main drive motor speeds shall be electronically controlled and the drive shall be equipped with an electric dynamic brake with regenerated power discharge resistor to absorb motor energy caused by high inertia loads during a fast or emergency stop. The main drive motor shall have sufficient power to drive all components listed in Table 1 within their normal operating speed range, plus 20 percent continuous overload capacity.

3.8.8 Test panel illumination. The test stand shall be equipped with adjustable illumination of the meter panel work area. The light shall operate from reduced voltage as described in par 3.8.6 above.

3.8.9 Cabinet. The test stand enclosure shall be made of sheet steel. The front panel shall have rounded edges. The top, side, and back panels of the test stand shall be separately removable without requiring complete disassembly of test stand. The cabinet shall be dimensionally in accordance with 3.8.10. A work area shall be provided on the test stand. The work area shall be covered with insulating and scuff-resistant material (e.g., rubber mat).

3.8.10 Dimensions. The AGRS test stand shall be free standing and not exceed 45 inches deep by 65 inches wide by 70 inches high basic enclosure dimensions. The overall operating dimensions shall not exceed 60 inches deep by 100 inches wide by 90 inches high.

3.8.11 Weight. The AGRS test stand shall not exceed 3,000 pounds dry weight.

3.8.12 Transportability. The AGRS test stand shall be transportable and as a minimum shall be skid-mounted and provided with four lifting eyes, for handling with a crane, and slots in the base/frame (front to rear) for handling with a fork lift truck. All lifting eyes shall allow unobstructed use of the work area. Provisions shall be provided to enable securing the test stand to the bed of a truck, van or aircraft and so located to be completely accessible without any disassembly of the test stand.

3.9 Fungus control. Components of electrical circuitry that are hermetically sealed or inherently resistant to fungus growth and moisture need not be treated. Components of electrical circuitry that are not inherently resistant to fungus growth or moisture shall be treated with a moisture and fungus proof varnish after the part is cleaned. The varnish should not be applied to any part where the treatment will interfere with performance.

3.10 Surface finishes.

3.10.1 Magnesium alloy parts. Magnesium alloy parts shall be surface treated to increase corrosion resistance by anodizing or chromate treatments, nickel plating or painting as applicable.

3.10.2 Steel parts. All exposed steel parts, except surfaces and those fabricated from oxidation-resisting steel, shall be zinc plated in accordance with ASTM B633. In cases where zinc plating is considered impractical or undesirable, the parts shall be painted.

3.11 Painting. Painting and finishing of the test stand shall be in accordance with the supplier's standard practice provided the following minimum criteria are met or exceeded: all surfaces to be painted shall have been cleaned to be free of all foreign matter detrimental to painting, and at least one coat of primer and one coat of enamel or equivalent have been applied. The color shall be gray.

3.12 Information plates.

3.12.1 Identification plate. A corrosion resistant metal or adhesive backed aluminum foil identification plate shall be permanently attached to the outside of the test stand. All lettering shall be permanently and legibly marked in Gothic capitals and numerals shall be Arabic (except the model number shall be the manufacturer's customary designation). Letters and numerals shall be of such a size as to be clearly legible. All test stands of one manufacturer supplied under a particular contract or purchase order shall be consecutively serial-numbered. The identification plate shall show the following information:

- Nomenclature
- Manufacturer's name
- Manufacturer's model designation
- Manufacturer's serial number
- Contractor's Commercial and Government Entity (CAGE) Code
- Power input characteristics and rating
- Contract number
- National Stock Number
- Date of manufacture
- U.S.

3.12.1.1 Location. Identification plate shall be visible after installation.

3.12.2 Lubrication chart or plate. A lubrication chart or plate shall be securely attached to the test stand. If a chart is used, it shall be laminated between clear plastic sheets permanently sealed and provided with suitable means for mounting on the test stand. The chart or plate shall provide the following information:

- Points of lubrication
- Service interval
- Type of lubrication
- Viscosity

3.13 Electrical diagrams. An internal wiring diagram identifying all cabling and their connections plus a complete schematic diagram(s) of the units electrical and electronic components and their function shall be furnished with each test stand. Each component shall be identified by its symbolic representation, electrical value and its interconnection. The wiring diagram and schematic diagram shall be laminated between clear plastic sheets, permanently sealed and provided with suitable means for mounting on the test stand. The electrical diagrams shall also be located in the AGRS Technical manual.

4 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specifications where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of Sections 3 and 5. The inspection set forth in this description for purchase shall become apart of the contractors overall inspection system or quality program. The absence of any inspection requirements in the description for purchase shall not relieve the contractor of the responsibility of assuring that all products submitted to the government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the government to acceptance of defective material.

4.2 Classification of inspection. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.4)
- b. Quality conformance inspection (see 4.5).

4.3 Inspection conditions. All inspections shall be performed in accordance with the test conditions specified in applicable paragraphs of the description for purchase.

4.4 First article inspection. First article inspection shall be applied to the preproduction sample or first production item noted in paragraph 3.2. First article inspection shall consist of the examination in 4.5.2 and all tests in 4.6, 4.7 and 4.9. Failure of the first article to pass the examination or any of the tests shall be cause for rejection.

4.5 Quality conformance inspection. Quality conformance inspection shall be applied to production units being offered for acceptance under the contract. The inspection shall consist of a through l as follows and failure of any unit to pass these inspections or tests shall be cause for rejection.

- a. Product examination (4.5.2)

- b. Health and environment requirement (4.6.1)
- c. Electrical protection (4.6.2)
- d. Dielectric strength (4.6.3)
- e. Accuracy (4.6.4)
- f. Functional characteristics (4.6.5)
- g. Integrated power supply (4.6.6)
- h. Electrical equipment (4.6.7)
- i. Main drive (4.6.8)
- j. Packaging inspection (4.7)
- k. Packaging validation tests (4.8)
- l. Weight verification (4.9)

4.5.1 Sampling. Sampling for quality conformance inspection shall be performed as listed with all samples selected randomly.

Inspection or Test	Lot or Batch Size	Sample Size
Product examination (4.5.2)		100%
Health and environment requirement (4.6.1)	1-150	13%
Electrical protection (4.6.2)	1-150	13%
Dielectric strength (4.6.3)	1-150	13%
Accuracy (4.6.4)	1-150	13%
Functional characteristics (4.6.5)*	1	---
Integrated power supply (4.6.6)*	1	---
Electrical equipment (4.6.7)*	1	---
Main drive (4.6.8)*	1	---
Packaging inspection (4.7)	1-150	5%
Packaging validation tests (4.8)*	1	---
Weight verification (4.9)*	1	---

The lots shall not exceed the maximum sizes indicated above. If lot size is less than or equal to sample size, 100% inspection is required. Each lot shall be accepted with no defect and rejected if one or more defects are found.

* If a First Article Test (FAT) is required in the contract, the validation tests shall be conducted on one test stand during FAT. If FAT is not required by the contract, then the validation tests shall be conducted on one of the items selected from the first lot submitted for quality conformance inspection and tests.

4.5.2 Product examination. Visually, dimensionally, and manually examine each test stand to determine conformance with the requirements of 3.1, 3.3 through 3.3.2.1, 3.3.4 through 3.4.2.1, 3.6, 3.8.1 through 3.8.4, 3.8.6, 3.8.8 through 3.10, 3.8.12 through 3.13. Visual examination shall include verification of completeness of manufacture and assembly, conformance to specified standards, adequacy of markings, proper cleaning, and freedom from the identified defects. Dimensional examination includes measuring dimensions as specified. Manual examinations shall include the operation of movable parts by hand to assure proper functioning. The examination provisions may be applied at the earliest practical point in manufacturing at which it is feasible to inspect for acceptance without risk of change in the characteristic by subsequent operation. Failure of the contractor to provide objective evidence that the item and its components have passed the examinations prescribed for them shall be cause for rejection. In addition, failure of the contractor to provide objective evidence that all parts are manufactured to definite standards, clearances, and tolerances so that no replacement part will

degrade the form, fit, or function of the end item (see 3.3.5), shall be cause for rejection.

4.6 Tests.

4.6.1 Health and environment requirement. The test stand shall be subjected to a noise evaluation to assure that the test stand meets the requirements specified by paragraph 3.3.3.1. The noise measurement system shall meet ANSI S1.11, Type II, or better.

4.6.2 Electrical protection. The test stand circuits shall be subject to momentary overload sufficient to assure that adequate protection devices are provided in accordance with 3.3.4.

4.6.3 Dielectric strength. The input power transformer of the test stand shall be subjected to 1000 volts root mean square (RMS) at 60 Hz plus twice the rated voltage between primary windings, secondary windings and core in accordance with ANSI standard testing procedures. Stabilize ambient temperature at 70 degrees F and maintain relative humidity at 40 to 50 percent. Accuracy of measuring shall be within 2 percent. After test, any evidence of damage shall be cause for rejection (see 3.5.1).

4.6.4 Accuracy. Each test stand circuit shall be measured for ascending and descending readings at major scale graduation to determine compliance with the requirements as specified by paragraph 3.5.2

4.6.5 Functional characteristics. The test stand shall demonstrate the following capabilities:

a. Induce and hold load capacities up to 14.25 kilowatts on generators and alternators at 28.5 VDC within normal operating speed range of the UUT and be capable of rotating generators at no load to a maximum of 12,000 rpm, including the direct drive UUTs.

b. Provisions to apply infinitely variable load from 0.0 to 14.25 KW

c. Measuring and hold appropriate voltage values on the generators, alternators and starters identified in TABLE 1.

d. Provide an infinitely variable speed range at the test generator or alternator drive shaft of 800 to 12,000 rpm.

e. Measure and indicate up to 12,000 revolutions per minute on all UUT's.

f. Provide and measure load capacities up to 500 amperes for single voltage alternators and generators at 28.5 VDC and up to 200 amperes for single voltage alternators and generators at 14.7 VDC.

g. Provide and measure the following load capacities on dual voltage alternators.

(1) 400 amperes at 28 VDC on the 24 volt output (12 volt output off).

(2) 200 amperes at 14 VDC on the 12 volt output (24 volt output off).

(3) 400 amperes total combined current on the 24 VDC and 12 VDC outputs simultaneously.

h. Provide fixed speed-load regulation to the generators and alternators under test. Speed and load (current) variation to the generator or alternator shall not exceed 3 percent each, at any fixed speed-load setting.

i. Using the separately provided circuit for testing starter solenoids, measure up to 12000 rpms on starters.

j. Accuracy for all instrumentation shall be within 1.5 percent of all meter values.

4.6.6 Starter power supply. The test stand shall demonstrate the capability of simulating 12 VDC and 24 VDC vehicular power systems and demonstrate the capability of supplying up to 200 amps with a circuit breaker to protect the circuit and power supply in the event a defective starter overloads the system. The output voltage shall be adjustable over the starter testing range. An energy-dissipating device shall be incorporated on both the 12 VDC and 24 VDC load bus to simulate energy absorption characteristics of batteries in a vehicular system. The operator adjustable timer shall demonstrate the capability to de-energize the power supply output to prevent starter motor overheating during free-running tests and prevent re-energizing of the power supply when on time exceeds 20 seconds. All internal circuitry shall be sized in accordance with the recommendations and requirements of NFPA 70.

4.6.7 Electrical equipment. The test stand shall demonstrate the capability to perform when connected to a 3 phase, 60 hertz, 208/230/460 VAC power source, 3 phase, 50 hertz, 220/380/440 VAC power source. All electrical supplies must conform to the recommendations and requirements of NFPA 70 (see 3.8.6).

4.6.8 Main drive. The main drive must demonstrate that it has sufficient power to drive and perform all tests on the generators, starters and alternators listed in TABLE 1 and maintain a constant rpm when the prescribed load is supplied to the UUT. The electric motor shall demonstrate the capability to protect against overload and low voltage damage. It shall be demonstrated that the main drive motor speeds are electronically controlled and that high inertia loads are absorbed by the dynamic braking system with activation of the emergency stop button while operating a generator at 20% overload and 8,000 rpm. The main drive motor shall demonstrate that it has sufficient power to drive all components listed in TABLE I within their normal operating speed range plus 20 per cent continuous overload capacity.

4.7 Packaging inspection. The items shall be inspected before and after packaging to determine compliance with the preservation, packaging, packing and marking requirements specified in Section 5.

4.8 Packaging validation tests. After the Quality Assurance inspection and tests have been successfully completed, one test stand, packaged in accordance with the requirements of Section 5 Packaging, shall be selected at random and subjected to the mechanical rough handling tests specified in paragraph 4.8.1 below. If a FAT is required by the contract, the rough handling tests shall be conducted on the test stand before FAT is performed and the FAT shall be performed on the test stand that was subjected to the rough handling test. If a FAT is not required by the contract, then a test stand selected at random from the first production lot that passed all Quality Conformance Inspections shall be used for the rough handling tests. The apparatus used shall be as described in paragraph 4.8.1. A dummy load shall not be used. All tests are to be conducted under ambient conditions. Environmental temperature/humidity tests are not required.

After the tests are completed, the container shall be inspected. Defects in accordance with those described in 4.8.2 shall be cause for rejection. The unit shall then be unpacked and again subjected to the Quality Assurance inspections and tests of paragraphs 4.5.2, 4.6 and 4.7 to reaffirm that the item meets the requirement. The unit shall then be repacked before submission for government acceptance. After testing and inspection, any damage to the packaging shall be repaired prior to acceptance of the lot.

4.8.1 Mechanical rough handling tests. This test for lifting and transporting by forklift truck shall be conducted as follows in the sequence given. The specimen shall be lifted clear of the ground by a forklift truck at one side of the specimen and transported on the forks in the level or the back-tilt position across a hard pavement for a distance not less than 100 feet. Parallel pairs of 1-inch by 4-inches boards (longer than the width of the forklift truck) spaced 54 inches apart shall be laid flat-wise on the pavement across the path of the forklift truck. The first pair shall be placed squarely across the truck's path and centered 30 feet from the point; the second pair shall be laid 60 feet from the point at an angle of about 60 degrees to the truck's path so the left wheel strikes first; the third pair shall be laid 90 feet from the starting point at about 75 degrees to the truck's path so the right wheel strikes first. If the specimen is less than 40 inches high and weighs less than 500 pounds, a load shall be superimposed on the specimen throughout the test to simulate stacking of the minimum number of specimens that will attain either a height not less than 80 inches or a weight not less than 1,000 pounds (for example. if a specimen were 30 inches high and weighed 200 pounds, superimposed load would be required. A stack of three would measure 90 inches high, which is not less than 80 inches, so the weight of two (400 pounds) would be superimposed on the test specimen. Similarly, if a test specimen were 15 inches high and weighed 300 pounds, a stack of four would weigh 1,200 pounds, which is not less than 1,000 pounds so the weight of three specimens (900 pounds) would be superimposed on the test specimen). If the specimen is more than 36 inches wide and is stable on 36-inch-long forks, the forks shall extend only 36 inches under the specimen. The forklift truck carrying the specimen and superimposed load, if required, shall travel the 100 feet in about 23 seconds at a uniform speed (normal walking speed), and then shall be brought to a stop. The specimen shall be carefully observed during the traverse and while the forklift truck is at a stop for any damage, evidence of inadequacy, or deflection of the specimen that might cause damage or displacement of the contents. A record shall be made of these observations. The specimen with it superimposed load, if any, shall then be lowered to the ground. The forklift truck shall be moved from the side to the end of the specimen. The forks shall be run under the specimen as far as possible and then operated to lift the end 6 inches. Observe the specimen, particularly in the vicinity of the ends of the forks, and record observations. If the specimen can thus be lifted clear of the floor, transport it on the forks over the same 100-foot course, and record observations. If it cannot be thus lifted, report the length of forks used and state that the specimen could not be carried on the forklift truck at either end.

4.8.2 Rough handling test pass/fail criteria. When the test is conducted to determine satisfactory performance of the container or pack, the report shall include a statement that the container or pack either attained or did not attain the specified performance. If not specified elsewhere, it is suggested that satisfactory performance shall consist of:

"When the container or package is subjected to the mechanical handling test, the contents (except a dummy load) shall show no functional or physical damage, and the container and packing shall show no functional damage. Damage to the exterior shipping container which is the result of improper interior packaging, blocking, or bracing shall be cause for rejection. Structural failure of the exterior shipping container, which would result in spilling of the contents

or failure of the container in subsequent handling, is cause for rejection. There shall be no evidence of a substantial amount of shifting if the contents within the exterior shipping container that would create conditions likely to cause damage during shipment, storage, and reshipment of the container. Minor container damage such as chipping of the wood members, negible dents, paint chipping, is not cause for rejection."

4.9 Weight verification. The test stand, with all adapter cables shall be placed on a scale to determine satisfactory weight compliance. After weighing, failure of the test stand to meet weight restrictions shall be cause for rejection (see 3.8.11).

5. PACKAGING.

Packaging Requirements Sheet Commercial DS6417

PRON:

DATE: 30 Sep 03

NSN:

ITEM: Test Stand: Alternator, Generator, Regulator and Starter

The preservation, packing, and marking requirements for the item identified above shall be accomplished in accordance with the performance requirements defined herein.

The following Packaging requirements shall apply:

**PRESERVATION: COMMERCIAL
LEVEL OF PACKING: Commercial**

QUANTITY PER UNIT PACKAGE: One (1) each Complete Test Stand

- 1 Packaging - Preservation, packaging, packing, unitization and marking furnished by the supplier shall provide protection for a minimum of one year, provide for multiple handling, redistribution and shipment by any mode and meet or exceed the following requirements.
 - 1.1 Cleanliness - Items shall be free of dirt and other contaminants which would contribute to the deterioration of the item or which would require cleaning by the customer prior to use. Coatings and preservatives applied to the item for protection are not considered contaminants.
 - 1.2 Preservation - Items susceptible to corrosion or deterioration shall be provided protection by means of preservative coatings, volatile corrosion inhibitors, waterproof and/or watervaporproof barriers.
 - 1.3 Cushioning - Items requiring protection from physical and mechanical damage (e.g. fragile, sensitive, material critical) or which could cause physical damage to other items, shall be protected by wrapping, cushioning, pack compartmentalization, or other means to mitigate shock and vibration to prevent damage during handing and shipment.
- 2 Unit Package. A unit package shall be so designed and constructed that it will contain the

contents with no damage to the item(s), and with minimal damage to the unit pack during shipment and storage in the shipping container, and will allow subsequent handling. The outermost component of a unit package shall be a container such as a sealed bag, carton or box.

3 Unit Package Quantity - Unless otherwise specified, the unit package quantity shall be one each part, set, assembly, kit, etc.

4 Intermediate Package - Intermediate packaging is required whenever one or more of the following conditions exists:

- a. the quantity is over one (1) gross of the same national stock number,
- b. use enhances handling and inventorying,
- c. the exterior surfaces of the unit pack is a bag of any type, regardless of size,
- d. the unit pack is less than 64 cubic inches,
- e. the weight of the unit pack is less than five (5) pounds and no dimension is over twelve (12) inches.

Intermediate containers shall be limited to a maximum of 100 unit packs, a net load of 40 pounds, or a maximum volume of 1.5 cubic feet, whichever occurs first.

5 Packing

5.1 Unit packages and intermediate packages not meeting the requirements for a shipping container shall be packed in shipping containers. All shipping containers shall be the most cost effective and shall be of minimum cube to contain and protect the items.

5.2. Shipping Containers - The shipping container (including any necessary blocking, bracing, cushioning, or waterproofing) shall comply with the regulations of the carrier used and shall provide safe delivery to the destination at the lowest tariff cost. The shipping container shall be capable of multiple handling, stacking at least ten feet high, and storage under favorable conditions (such as enclosed facilities) for a minimum of one year.

6 Unitization: Shipments of identical items going to the same destination shall be palletized if they have a total cubic displacement of 50 cubic feet or more unless skids or other forklift handling features are included on the containers. Pallet loads must be stable, and to the greatest extent possible, provide a level top for ease of stacking. A palletized load shall be of a size to allow for placement of two loads high and wide in a conveyance. The weight capacity of the pallet must be adequate for the load. The preferred commercial expendable pallet is a 40 x 48 inch, 4-way entry pallet although variations may be permitted as dictated by the characteristics of the items being unitized. The load shall be contained in a manner that will permit safe handling during shipment and storage.

7 Marking:

7.1 All unit packages, intermediate packs, exterior shipping containers, and, as applicable, unitized loads shall be marked in accordance with MIL-STD-129, Revision P, Date 15 Dec 02 including bar coding. The contractor is responsible for application of special markings as discussed in the Military Standard regardless of whether specified in the contract or not. Special markings include, but are not limited to, Shelf-life markings, structural markings, and transportation special handling markings. The marking of pilferable and sensitive materiel will not identify the nature of the materiel.

7.2 Contractors and vendors shall apply address markings using a bar coded military shipment label (MSL) for all shipments except contractor-to-contractor. The MSL will include both linear and 2D bar codes per the standard. The DD Form 250 or the commercial packing list shall have bar coding applied as per Direct Vendor Delivery Shipments in the standard (except for deliveries to DLA Distribution Depots, e.g. New Cumberland, San Joaquin, Red River, Anniston).

7.3 Contractor to contractor shipments shall have the address markings applied to the identification marked side of the exterior shipping container or to the unitized load markings. The following shall be marked "FROM: name and address of consignor and TO: name and address of consignee".

7.4 Military Shipping Label. The Army has developed software to create Military Shipment Labels. It's called Computer Automated Transportation Tool Military Shipment Label/Issue Receipt Release Document (CATT MSL/IRRD) and is available to anyone with a contract with the government. The software can be downloaded from the following website main page: <http://www.asset-trak.com/catt/catt.htm>. Or go directly to the software download page http://www.asset-trak.com/catt/msl_irrd/msl_irrddownload.htm. Be sure to bookmark this page for future releases of CATT MSL/IRRD.

8 Hazardous Materials: In addition to the general instructions listed above, hazardous materials or items as defined in CFR Title 49 are also subject to all applicable Department of Transportation regulations for packaging/packing, marking, labeling, container certification, and transport as listed in Code of Federal Regulations Title 49, Parts 100-180. If the shipment originates from outside the continental United States, the shipment shall be prepared in accordance with the United Nations Recommendations on the Transport of Dangerous Goods in a manner acceptable to the Competent Authority of the nation of origin and in accordance with regulations of all applicable carriers.

9 Heat Treatment and Marking of Wood Packaging Materials: All non-manufactured wood used in packaging shall be heat treated to a core temperature of 56 degrees Celsius for a minimum of 30 minutes. The box/pallet manufacturer and the manufacturer of wood used as inner packaging shall be affiliated with an inspection agency accredited by the board of review of the American Lumber Standard Committee. The box/pallet manufacturer and the manufacturer of wood used as inner packaging shall ensure tractability to the original source of heat treatment. Each box/pallet shall be marked to show the conformance to the International Plant Protection Convention Standard. Boxes/pallets and any wood used as inner packaging made of non-manufactured wood shall be heat-treated. The quality mark shall be placed on both ends of the outer packaging, between the end cleats or end battens, on two sides of the pallet. . Foreign manufacturers shall have the heat treatment of non-manufactured wood products verified in accordance with their National Plant Protection Organization's compliance program.

10 Quality Assurance: The contractor is responsible for establishing a quality system. Full consideration to examinations, inspections, and tests will be given to ensure the acceptability of the commercial package.

11 **SUPPLEMENTAL INSTRUCTIONS:** The following additional requirements shall also be adhered to.

Disassembly shall be held to a minimum. The Test Stand maybe disassembled if necessary to afford protection to components, attachments and accessories against damage, pilferage and to reduce cubage. Disassembled parts shall be clearly marked as to identity and location on the test stand and match marked if necessary to facilitate reassembly.

Gages, dial indicators, and any other measuring and indicating devices shall be protected from bumping, scratching, jarring or anything that will cause physical or functional damage or maladjustment.

The electrics, except those components inherently resistant to corrosion, deterioration and fungus growth, shall be afforded protection to preclude the effects of corrosion, deterioration and fungus growth by applying the appropriate preservative. The preservative applied to the electrics shall not interfere with the components either electrically or mechanically. All openings shall be sealed to prevent the entry of foreign matter

There shall be no leaks of any kind from fluid reservoirs, or connecting tubing when filled with their normal operating fluid. If the operating fluid cannot be left in its reservoir without leaking, the reservoir shall be drained and the fluid placed in a metal container and shipped with the Test Stand.

Technical data shall be sent with the machine, and protected from smears, blots, ripping, and ink running.

Extra care shall be taken to ensure that the integrity of the preserved and unpreserved surfaces of the machine shall be maintained during the packing operations.

Movable parts on the machine shall be immobilized.

The Test Stand, its disassembled parts, component parts and accessories shall be packed in a fully enclosed wooden box with forklift capabilities. The placement of the machine and its parts in the shipping container shall not be cause for scratching, denting, galvanic corrosion or damage to the substrate of any item. Each shipping container shall contain only one machine with all parts and accessories. The arrangement of contents, cushioning, anchoring, blocking and bracing shall be such as to prevent any physical or functional damage when the machine is subjected to air, sea, rail or truck transport, forklift handling, tipping, bumping, or falling. The materials used in the anchoring, blocking, bracing and cushioning shall not promote corrosion or be detrimental to the substrate.

The preservation and packaging requirements, as stated above are deemed necessary due to the likelihood of lengthy periods of storage before the items are issued for use. These requirements may also be necessary to provide adequate protection for future shipments overseas.

If oak or chestnut wood products are used in the performance of the contract, these wood or wood products must be free from all bark.

Workmanship shall be such that when proper procedure is followed, materials and equipment being processed will be provided the maximum protection against corrosion, deterioration and be

suitable for storage to the level of packaging specified.